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THE PARTIES

2. Brazos is a limited liability corporation organized and existing under the laws of Delaware, with its principal place of business at 605 Austin Ave, Ste 6, Waco, TX 76701.

3. On information and belief, Defendant Huawei Investment & Holding Co., Ltd. is a Chinese corporation that does business in Texas, directly or through intermediaries, with a principal place of business at Bantian, Longgang District, Shenzhen, 518129, People's Republic of China.

4. On information and belief, Defendant Huawei Technologies Co., Ltd. is a Chinese corporation that does business in Texas, directly or through intermediaries, with a principal place of business at Bantian, Longgang District, Shenzhen 518129, People's Republic of China.

5. Upon information and belief, Defendant Huawei Technologies USA Inc. is a corporation organized and existing under the laws of Texas that maintains an established place of business at 2391 NE Interstate 410 Loop, San Antonio, TX 78217. Huawei Technologies USA, Inc. is authorized to do business in Texas and may be served via its registered agent, CT Corporation System, 1999 Bryan Street, Suite 900, Dallas, Texas 75201-3136.

6. Upon information and belief, Defendant Huawei Device Co. Ltd. (formerly known as Huawei Device (Dongguan) Co.) is a Chinese corporation that does business in Texas, directly or through intermediaries, and maintains a principal place of business in No.2 of Xincheng Road, Songshan Lake Zone, Dongguan, Guangdong 523808, People's Republic of China.

7. Upon information and belief, Huawei Device (Shenzhen) Co., Ltd. (formerly known as Huawei Device Co., Ltd.) is a wholly-owned subsidiary of Defendant Huawei

Device Co. Ltd. is a Chinese corporation that does business in Texas, directly or through intermediaries, and maintains a principal place of business in Bantian, Longgang District, Shenzhen 518129, People's Republic of China.

8. On information and belief, Defendant Huawei Device USA, Inc., is a Texas corporation with a principal place of business located at 5700 Tennyson Parkway, Suite 600, Plano, Texas 75024. Huawei Device USA, Inc. is authorized to do business in Texas and may be served via its registered agent, CT Corporation System, 1999 Bryan Street, Suite 900, Dallas, Texas 75201-3136.

9. All of the Defendants operate under and identify with the trade name "Huawei." Each of the Defendants may be referred to individually as a "Huawei Defendant" and, collectively, Defendants may be referred to below as "Huawei" or as the "Huawei Defendants." Upon information and belief, Defendant Huawei Investment & Holding Co., Ltd. provides consolidated financial reporting for Huawei entities, including all Huawei Defendants.

JURISDICTION AND VENUE

10. This is an action for patent infringement which arises under the Patent Laws of the United States, in particular, 35 U.S.C. §§271, 281, 284, and 285.

11. This Court has jurisdiction over the subject matter of this action under 28 U.S.C. §§ 1331 and 1338(a).

12. This Court has specific and general personal jurisdiction over each Huawei Defendant pursuant to due process and/or the Texas Long Arm Statute, because each Huawei Defendant has committed acts giving rise to this action within Texas and within this judicial district. The Court's exercise of jurisdiction over each Huawei Defendant would not offend traditional notions of fair play and substantial justice because Huawei has established

minimum contacts with the forum. For example, on information and belief, Huawei Defendants have committed acts of infringement in this judicial district, by among other things, selling and offering for sale products that infringe the asserted patent, directly or through intermediaries, as alleged herein.

13. Venue in the Western District of Texas is proper pursuant to 28 U.S.C. §§1391 and 1400(b) because Huawei Technologies USA Inc. and Huawei Device USA Inc. have committed acts of infringement in this judicial district and have a regular and established places of business in this judicial district and in Texas. As non-limiting examples, on information and belief, Huawei Technologies USA Inc. and Huawei Device USA Inc. have sold or offered to sell the Accused Products in this judicial district and have employees or agents that operate Huawei equipment in this judicial district, including at 189 CR 265, Georgetown, TX 78626, 1150 S Bell Blvd, Cedar Park, TX 78613, 1399 S A W Grimes Blvd, Round Rock, TX 78664, 12335 IH 35, Jarrell, TX 76537, 1050 Rabbit Hill Rd, Unit #E, Georgetown, TX 78626, 1602 A W Grimes Blvd, Round Rock, TX 78664, 4120 IH 35 N, Georgetown, TX 78626, 900 CR 272, Leander, TX 78641, 1950 Crystal Falls Pkwy, Leander, TX 78641, 1101 N Industrial Blvd, Round Rock, TX 78681, 506 McNeil Rd, Round Rock, TX 78681, 3210 Chisholm Trail Rd, Round Rock, TX 78681, 112 Roundville Ln, Round Rock, TX 78664, 202 Central Dr W, Georgetown, TX 78628, 3595 E Hwy 29, Georgetown, TX 78626, 1402 W Welch St, Taylor, TX 76574, 3801 Oak Ridge Dr, Round Rock, TX 78681, 1957 Red Bud Ln #B, Round Rock, TX 78664, 6603 S Lakewood Dr, Georgetown, TX 78633, 500 W Front, Hutto, TX 78634.

COUNT ONE - INFRINGEMENT OF
U.S. PATENT NO. 8,429,480

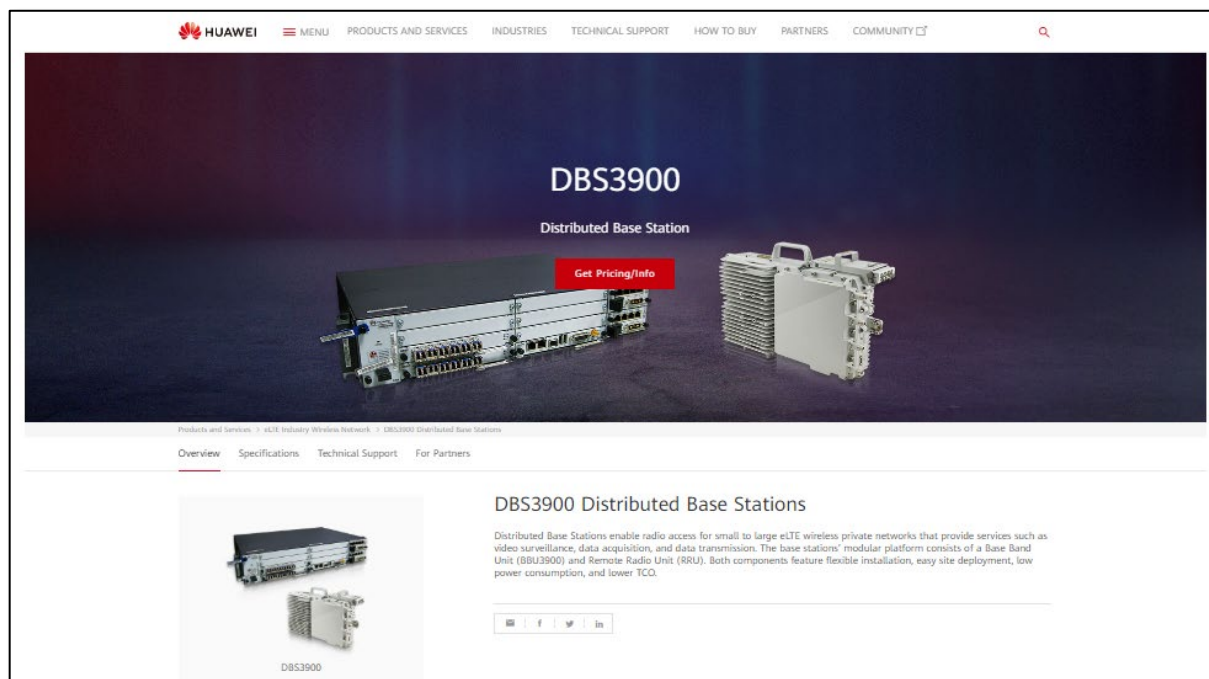
14. Brazos re-alleges and incorporates by reference the preceding paragraphs of this Complaint.

15. On April 23, 2013, the United States Patent and Trademark Office duly and legally issued U.S. Patent No. 8,429,480 (“the ’480 Patent”), entitled “User Specific Load Balancing.” A true and correct copy of the ’480 Patent is attached as Exhibit A to this Complaint.

16. Brazos is the owner of all rights, title, and interest in and to the ’480 Patent, including the right to assert all causes of action arising under the ’480 Patent and the right to any remedies for the infringement of the ’480 Patent.

17. Huawei makes, uses, sells, offers for sale, imports, and/or distributes in the United States, including within this judicial district, products such as, but not limited to, Huawei LTE Base Stations (collectively, the “Accused Products”).

18. The Accused Products include, but are not limited to the DBS3900 Base Station.



<http://e.huawei.com/us/products/wireless/lte-access/base-station/dbs3900>

19. Huawei evolved Long Term Evolution (eLTE) 2.3 base station (such as DBS3900 etc.) is the enhanced version of the eLTE 2.2 base station. DBS 3900 LTE Base Stations use LBFD-002006 Uplink Synchronous functionality which applies to the Macro, Mini and Lamp sites.

Dependency
None
1.2.6 LBFD-002006 UL Synchronous HARQ
Availability
This feature is
<ul style="list-style-type: none">• applicable to Macro from eRAN1.0• applicable to Micro form eRAN3.0• applicable to Lampsite from eRAN6.0

:<https://www.scribd.com/doc/297654386/ELTE2-3-DBS3900-LTE-FDD-Basic-Feature-Description>,

20. User equipment (UE) or mobile device sends data in uplink through Physical Uplink Shared Channel (PUSCH) to the base station. eNodeB (i.e., a base station) determines the correctness of received data using the Cyclic Redundancy Check (CRC) and sends one of the acknowledgment or negative acknowledgment (ACK/NACK) to UE in response to the said data through Physical HARQ Indicator Channel (PHICH).

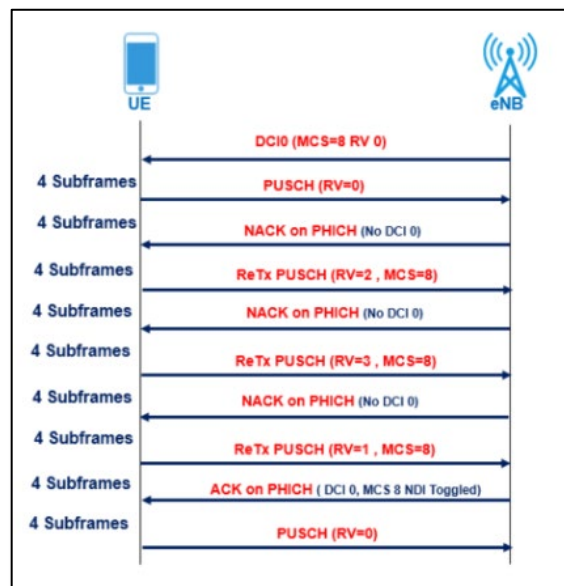
21. HARQ processes in the Accused Instrumentality use Round Robin manner to transmit HARQ. Each transmission and re-transmission can be determined from System Frame Number (SNF) and System Frames (SF). UE does not need to send information of Redundancy Version (RV) as used in the traditional ARQ process. In LTE, uplink can use adaptive or non-adaptive re-transmission.

HARQ Procedure During Uplink Transmission

When UE sends data in uplink through PUSCH, eNB has to determine it's correctness using **CRC** and inform UE about the ACK/NACK. eNodeB sends ACK/NACK through **PHICH**. Each HARQ processes use Round Robin fashion to transmit HARQ, hence, each transmission and re-transmission can be determined from SFN and SF. UE does not need to send information of RV (**synchronous HARQ**).

<http://www.techplayon.com/hybrid-automatic-repeat-request-harq-in-lte-fdd/>

22. In adaptive uplink transmission, Modulation coding scheme (MCS) and RV are determined from DCI 0. In non-adaptive uplink transmission, the transmission attributes remain the same as in the previous transmission. RV are assigned according to a predefined sequence-0,2,3,1. Variable CURRENT_IRV is an index into this sequence. When eNodeB does not send a DCI 0 but sends a NACK on PHICH, then UE performs non-adaptive re-transmission.



<http://www.techplayon.com/hybrid-automatic-repeat-request-harq-in-lte-fdd/>

23. The Uplink Hybrid Automatic Repeat Request (UL HARQ) functionality is a fast retransmission protocol to guarantee successful data transmission from the UE to the eNodeB at the physical layer and MAC layer.

24. An eNodeB can request retransmissions of incorrectly decoded data. The retransmitted data can be soft combined with the previously received data to improve decoding performance. This feature enhances user throughput and reduces transmission latency in the uplink

Benefits

The UL HARQ functionality is a fast retransmission protocol to ensure successful data transmission from the UE to the eNodeB at the physical layer and MAC layer. An eNodeB can request retransmissions of incorrectly decoded data. The retransmitted data can be soft-combined with the previously received data to improve decoding performance.

This feature helps improve user throughput and reduce transmission latency in the uplink.

<https://www.scribd.com/doc/297654386/ELTE2-3-DBS3900-LTE-FDD-Basic-Feature-Description>,

25. Huawei eNodeB supports automatic switching between the synchronous adaptive HARQ and synchronous non-adaptive HARQ. Operators can specify the retransmission mode by setting the `AdaptHarqSwitch` parameter.

- Huawei eNodeB also supports automatic switching between the adaptive and non-adaptive modes. Operators can specify the retransmission mode by the `AdaptHarqSwitch` parameter. The automatic switching between the two modes is used by default.

<https://www.scribd.com/document/349833390/4-OEO109040-LTE-ERAN8-1-Scheduling-Feature-ISSUE1-01>

26. In case of UL synchronous adaptive HARQ, eNodeB adjusts the number of Resource Blocks (RBs) for the retransmission to avoid the collision and eNodeB suspends the retransmission in case of UL synchronous non-adaptive HARQ.

27. eNodeB checks the collisions of uplink data with the PUCCH transmission, PRACH transmission, and TTI bundled retransmission. In case of collision occurrence, the eNodeB needs to reactivate semi-persistent scheduling as shown in FIG. 7& FIG. 8.

- If this switch is set to ADAPTIVE_HARQ_SW_OFF, UL data is retransmitted by non-adaptive synchronous HARQ. If this switch is set to ADAPTIVE_HARQ_SW_ON, UL data is retransmitted by adaptive synchronous HARQ. If this switch is set to ADAPTIVE_HARQ_SW_SEMION, adaptive HARQ is triggered when a UL grant is delivered to an HARQ process that is previously suspended due to reasons such as resource collision, activation of a measurement gap, and PDCCH congestion. Setting this parameter to ADAPTIVE_HARQ_SW_ON helps reduce resource consumption due to retransmission, increase the cell throughput, and prevent retransmission conflicts. This, on the other hand, will increase signaling overhead and therefore consume more PDCCH resources.

<https://www.scribd.com/document/349833390/4-OEO109040-LTE-ERAN8-1-Scheduling-Feature-ISSUE1-01>

Semi-Persistent Scheduling

When the physical downlink control channel (PDCCH) results in insufficient system capacity, this function can improve VoLTE user capacity by reducing the PDCCH overhead, or can increase data throughput with the unchanged number of VoLTE users.

When voice services are dynamically scheduled, time-frequency resources or Multimedia Communication Services (MCS) are updated on the PDCCH every 20 ms, which consumes a large number of PDCCH resources. Huawei provides the VoIP semi-persistent scheduling feature for periodically transmitted small packet VoIP services. Before entering a talk spurt state, the eNodeB only allocates fixed resources to the UE through a PDCCH message once and does not need to allocate resources again before ending a talk spurt or releasing resources. In this way, PDCCH resources are saved. When setting up the QCI1 DRB, the eNodeB configures the semi-persistent scheduling parameters in the RRC Connection Reconfiguration message for a UE that supports the semi-persistent scheduling feature. As long as a UE meets the requirements for activating semi-persistent scheduling, the eNodeB instructs the UE to enable this function in the uplink or downlink through a PDCCH Order. For details about the PDCCH Order format for activating semi-persistent scheduling, see section 9.2 in 3GPP TS 36.213 (V12.3.0).

The period of semi-persistent scheduling can only be set to 20 ms and is applicable only for QCI1 and PTT QCI services.

<https://carrier.huawei.com/en/technical-topics/wireless-network/VoLTE/2>

28. UE contains a HARQ entity that maintains several parallel HARQ processes. HARQ entity supports continuous transmissions of data without waiting for the HARQ feedback on the successful or unsuccessful receipt of previous transmissions.

5.4.2 HARQ operation

5.4.2.1 HARQ entity

There is one HARQ entity at the MAC entity for each Serving Cell with configured uplink, which maintains a number of parallel HARQ processes allowing transmissions to take place continuously while waiting for the HARQ feedback on the successful or unsuccessful reception of previous transmissions.

The number of parallel HARQ processes per HARQ entity is specified in TS 36.213 [2], clause 8. NB-IoT has one or two UL HARQ processes.

When the physical layer is configured for uplink spatial multiplexing, as specified in TS 36.213 [2], there are two HARQ processes associated with a given TTI. Otherwise there is one HARQ process associated with a given TTI.

https://www.etsi.org/deliver/etsi_ts/136300_136399/136321/15.08.00_60/ts_136321v150800p.pdf.

29. In the case of a given TTI, if an uplink grant is indicated for the TTI, the HARQ entity shall specify the HARQprocess(s) for which the transmission will take place. It also forwards the received HARQ feedback (ACK/NACK information), MCS and resource, forwarded by the physical layer, to the correct HARQprocess(s).

When TTI bundling is configured, the parameter TTI_BUNDLE_SIZE provides the number of TTIs of a TTI bundle. TTI bundling operation relies on the HARQ entity for invoking the same HARQ process for each transmission that is part of the same bundle. Within a bundle HARQ retransmissions are non-adaptive and triggered without waiting for feedback from previous transmissions according to TTI_BUNDLE_SIZE. The HARQ feedback of a bundle is only received for the last TTI of the bundle (i.e the TTI corresponding to TTI_BUNDLE_SIZE), regardless of whether a transmission in that TTI takes place or not (e.g. when a measurement gap occurs). A retransmission of a TTI bundle is also a TTI bundle. TTI bundling is not supported when the MAC entity is configured with one or more SCells with configured uplink.

https://www.etsi.org/deliver/etsi_ts/136300_136399/136321/15.08.00_60/ts_136321v150800p.pdf.

30. Scheduling is the process of allocating resources for transmitting data. UE uses semi-persistence scheduling generally dynamic scheduling for resource allocation to avoid a collision.

31. UE gets scheduling assignments/grants in every subframe. This gives the eNodeB full flexibility in assigning the resources to the UE by transmitting resource allocation information on PDCCH in every subframe and allowing eNodeB to assign resources to UE based on the channel condition.

32. SPS feature is also designed to reduce the control channel overhead for Voice over IP (VoIP) based services.

LTE: Semi-Persistent Scheduling

In the case of Dynamic Scheduling, the UE can get scheduling assignments/grants in every subframe. This gives the network full flexibility in assigning the resources to the UE at the cost of transmission of resource allocation information on PDCCH in every subframe. This also gives the flexibility of varying the resource allocation based on the reported channel conditions

For services such as VoIP, the packet size is small and the inter-arrival time of VoIP packets is constant (i.e., AMR codec provides one packet every 20ms during active period and one silence indicator (SID) at 160ms). The control signaling overhead (PDCCH) is too much for the E-UTRAN in order to support a large number of VoIP users. So, the optimal solution is to allocate the resources at once and let the UE use these resources instead of allocating the resources periodically.

<https://howtestuffworks.blogspot.com/2013/10/semi-persistent-scheduling.html>

33. Dynamic scheduling (i.e., semi-persistent scheduling) is the mechanism in which each and every PUSCH is scheduled by DCI (DCI 0_0 or DCI 0_1). In Semi-Persistent scheduling (SPS), the physical downlink shared channel (PDSCH) transmission is scheduled by RRC message.

Uplink Dynamic Scheduling

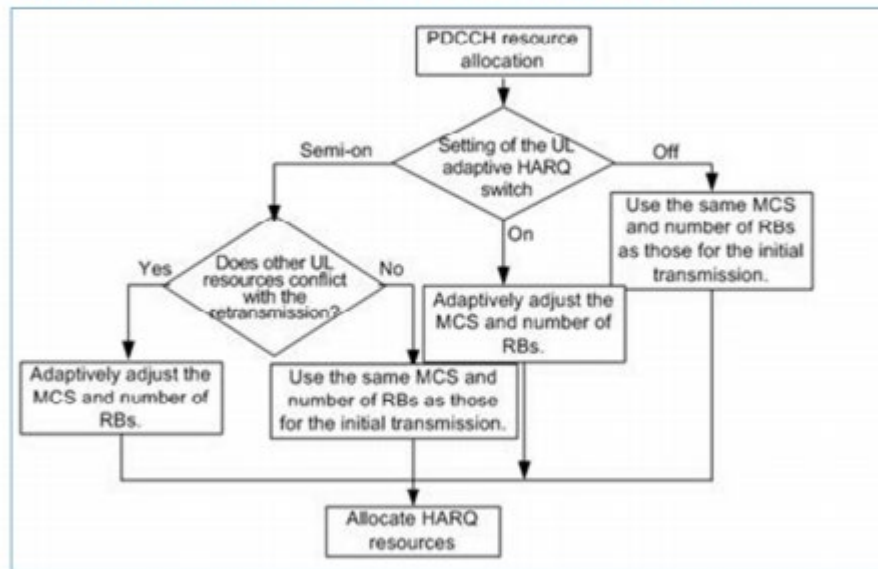
When uplink dynamic scheduling uses the enhanced proportional fair (EPF) algorithm, the priority of conversational voice (QCI 1) is lower than the priorities of data retransmitted using HARQ, signaling radio bearer 1 (SRB1), SRB2, and IMS signaling (QCI 5), but higher than the priorities of other initially transmitted data.

It is recommended that the **UPLast2RetransSchOptSwitch** option of the **CellAlgoSwitch**.**UISchSwitch** parameter be selected when dynamic scheduling is used and there are voice services. Selecting this option decreases the packet loss rate of voice services and improves the user experience on voice services.

Uplink voice preallocation is introduced to reduce the delay of voice services. When the number of UEs in a cell exceeds 50, the eNodeB can preallocate available uplink resources to only UEs performing voice services. When the number of UEs in a cell is less than or equal to 50, the eNodeB retains the existing uplink preallocation or uplink smart preallocation mechanism. For details, see *Scheduling Feature Parameter Description*. Uplink voice preallocation is controlled by the **UIVoipPreAllocationSwitch** option of the **CELLULSCHALGO**.**UIEnhancedVoipSchSw** parameter.

https://dlscrib.com/queue/volte-eran8-1-03_58aadb276454a72d34b1ea62_pdf?queue_id=59d2d40808bbc58a5a6871a2.

Synchronized UL Retransmission



<https://www.scribd.com/document/349833390/4-OEO109040-LTE-ERAN8-1-Scheduling-Feature-ISSUE1-01>

34. In LTE SPS feature is designed to reduce the control channel overhead for Voice over IP (VoIP) based services. Since Voice over LTE (VoLTE) requires persistent radio resource allocation at a regular interval (one packet in 20ms from AMR speech codec). To support a large number of VoIP calls there is a huge overhead on control signaling.

35. In LTE, VoIP periodically generates small-sized packets at short and regular intervals. To avoid lot of downlink assignment and uplink grant, SPS feature significantly reduces heavy load on PDCCH by doing minimum downlink assignment and uplink grant. SPS allocates radio resources for a long period of time.

36. In SPS the UE is pre-configured by the eNodeB with the SPS-RNTI (Instead of the regular C-RNTI) and a periodicity. Once configured the UE receives the DL/UL data at the configured

periodicity.

Semi-Persistent Scheduling

When the physical downlink control channel (PDCCH) results in insufficient system capacity, this function can improve VoLTE user capacity by reducing the PDCCH overhead, or can increase data throughput with the unchanged number of VoLTE users.

When voice services are dynamically scheduled, time-frequency resources or Multimedia Communication Services (MCS) are updated on the PDCCH every 20 ms, which consumes a large number of PDCCH resources. Huawei provides the VoIP semi-persistent scheduling feature for periodically transmitted small packet VoIP services. Before entering a talk spurt state, the eNodeB only allocates fixed resources to the UE through a PDCCH message once and does not need to allocate resources again before ending a talk spurt or releasing resources. In this way, PDCCH resources are saved. When setting up the QCI1 DRB, the eNodeB configures the semi-persistent scheduling parameters in the RRC Connection Reconfiguration message for a UE that supports the semi-persistent scheduling feature. As long as a UE meets the requirements for activating semi-persistent scheduling, the eNodeB instructs the UE to enable this function in the uplink or downlink through a PDCCH Order. For details about the PDCCH Order format for activating semi-persistent scheduling, see section 9.2 in 3GPP TS 36.213 (V12.3.0).

The period of semi-persistent scheduling can only be set to 20 ms and is applicable only for QCI1 and PTT QCI services.

37. In view of preceding paragraphs, each and every element of at least claim 1 of the '480 Patent is found in the Accused Products.

38. Huawei has and continues to directly infringe at least one claim of the '480 Patent, literally or under the doctrine of equivalents, by making, using, selling, offering for sale, importing, and/or distributing the Accused Products in the United States, including within this judicial district, without the authority of Brazos.

39. Huawei has received notice and actual or constructive knowledge of the '480 Patent since at least the date of service of this Complaint.

40. Since at least the date of service of this Complaint, through its actions, Huawei has actively induced product makers, distributors, retailers, and/or end users of the Accused Products to infringe the '480 Patent throughout the United States, including within this judicial district, by, among other things, advertising and promoting the use of the Accused Products in various websites, including providing and disseminating product descriptions, operating manuals, and other instructions on how to implement and configure the Accused

Products. Examples of such advertising, promoting, and/or instructing include the documents at:

- <http://e.huawei.com/us/products/wireless/elte-access/base-station/dbs3900>

41. Since at least the date of service of this Complaint, through its actions, Huawei has contributed to the infringement of the '480 Patent by having others sell, offer for sale, or use the Accused Products throughout the United States, including within this judicial district, with knowledge that the Accused Products infringe the '480 Patent. The Accused Products are especially made or adapted for infringing the '480 Patent and have no substantial non-infringing use. For example, in view of the preceding paragraphs, the Accused Products contain functionality which is material to at least one claim of the '480 Patent.

JURY DEMAND

Brazos hereby demands a jury on all issues so triable.

REQUEST FOR RELIEF

WHEREFORE, Brazos respectfully requests that the Court:

(A) Enter judgment that Huawei infringes one or more claims of the '480 Patent literally and/or under the doctrine of equivalents;

(B) Enter judgment that Huawei has induced infringement and continues to induce infringement of one or more claims of the '480 Patent;

(C) Enter judgment that Huawei has contributed to and continues to contribute to the infringement of one or more claims of the '480 Patent;

(D) Award Brazos damages, to be paid by Huawei in an amount adequate to compensate Brazos for such damages, together with pre-judgment and post-judgment interest for the infringement by Huawei of the '480 Patent through the date such judgment

is entered in accordance with 35 U.S.C. §284, and increase such award by up to three times the amount found or assessed in accordance with 35 U.S.C. §284;

(E) Declare this case exceptional pursuant to 35 U.S.C. §285; and

(F) Award Brazos its costs, disbursements, attorneys' fees, and such further and additional relief as is deemed appropriate by this Court.

Dated: June 17, 2020

Respectfully submitted,

/s/ James L. Etheridge

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